APPENDIX G

Hydrology and Water Quality Technical Report

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HYDROLOGY AND WATER QUALITY TECHNICAL REPORT

for the

LAS COLINAS DETENTION FACILITY
SANTEE, CALIFORNIA

Prepared for:

COUNTY OF SAN DIEGO

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LIST OF ABBREVIATIONS AND ACRONYMS

AGI	American Geological Institute
AMSL	Above Mean Sea Level
Basin Plan	Water Quality Control Plan for the San Diego Basin
BLS	Below Land Surface
BMPs	Best Management Practices
CFS	Cubic Feet Per Second
CGS	California Geological Survey
CWA	Clean Water Act
DWR	Department of Water Resources
FT	Feet
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
HA	Hydrologic Area
HSA	Hydrologic Sub-Area
HU	Hydrologic Unit
IN/HR	Inches per Hour
IMPs	Integrated Management Practices
LCDF	Las Colinas Detention Facility
LID	Low Impact Development
MC	Municipal Code
MEP	Maximum Extent Practicable
MG/L	Milligrams per Liter
MPN	Most Probable Number
MS4	Municipal Separate Storm Sewer System
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System
RWQCB	Regional Water Quality Control Board
SDSD	San Diego County Sheriff's Department
SF	Square Feet
SRWCB	State Water Resources Control Board
SUSMP	Standard Urban Storm Water Mitigation Plan
SWMP	Storm Water Management Plan
SWPPP	Storm Water Pollution Prevention Plan
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TP	Total Phosphorous
USGS	United States Geological Survey
WLA	Waste Load Allocation
WQA	Water Quality Act 1987
WQOs	Water Quality Objectives

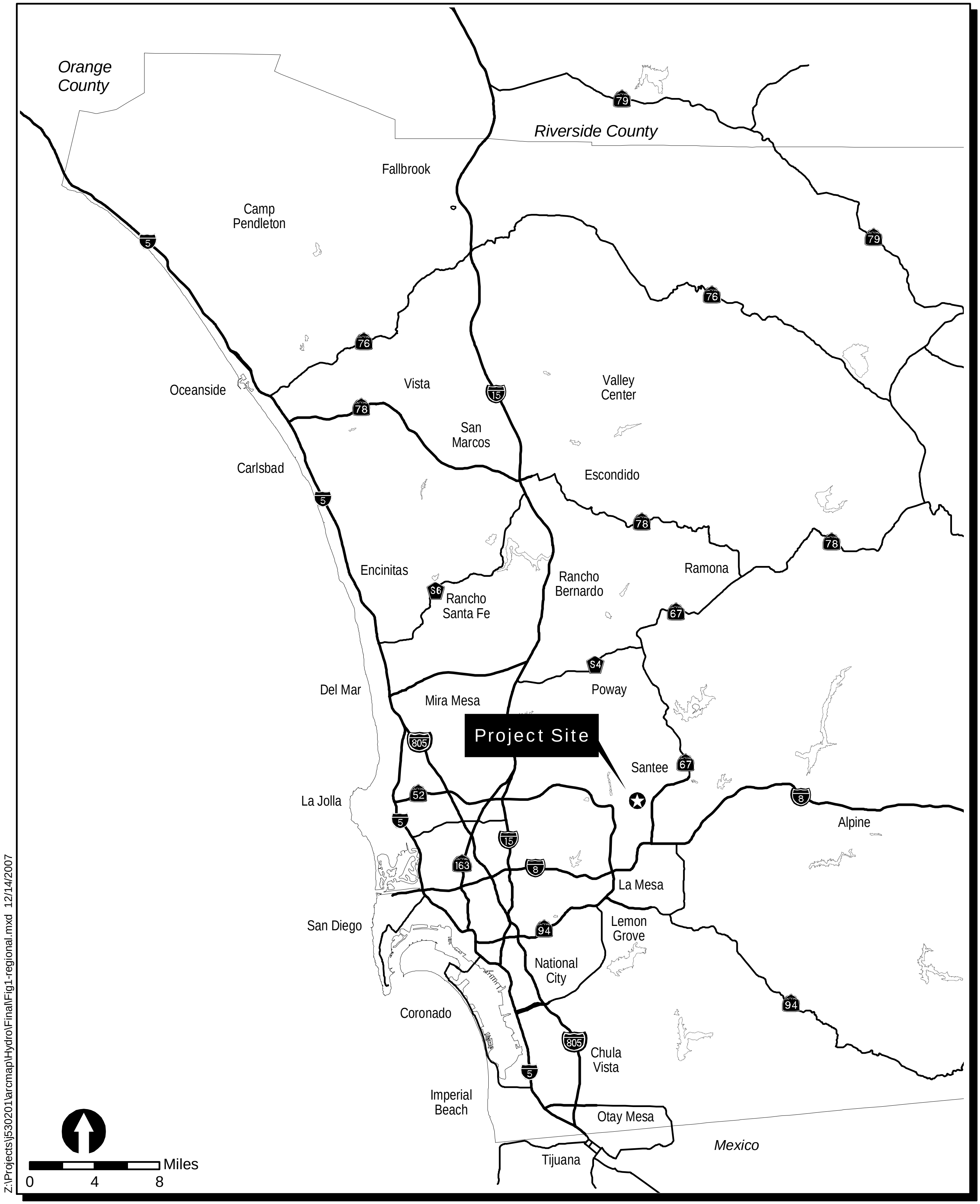
1.0 INTRODUCTION

1.1 Project Description

The San Diego County Sheriff's Department (SDSD) is responsible for providing adult detention facilities for San Diego County. To accomplish this, SDSD must anticipate future incarceration needs and plan appropriate facilities and programs for current and future inmates. In 2001, SDSD completed a Master Plan that forecasted the expected growth in inmate population and defined a long-range capital program to meet the projected local incarceration needs (SDSD 2001). As part of this effort, the need for improvements to and expansion of facilities and services for women was considered. To meet the projected needs for women offenders, SDSD is proposing to replace the existing Las Colinas Detention Facility (LCDF) on and adjacent to the grounds of the existing LCDF with a new 1,216-bed multi-custody women's detention facility.

The proposed project would replace the existing LCDF on and adjacent to the grounds of the existing LCDF and portions of the Edgemoor Hospital site with a new 1,216-bed multi-custody women's detention facility. As shown in *Figures 1* through *4*, the LCDF project site consists of 45.5 acres of County-owned property located within the City of Santee, in eastern San Diego County. The site is bounded by Magnolia Avenue to the east, Mission Gorge Road located 400 feet to the south, developing office/commercial uses associated with the City of Santee Town Center Specific Plan to the west, and the San Diego River 600 feet to the north. The Assessor's Parcel Number (APN) for the site is 381-050-7000.

Surrounding land uses to the southeast include residential subdivisions east of Magnolia Avenue, single family residences to the immediate south of the project site, Santee Town Center to the west, south, and north, and the San Diego River to the north. The San Diego River serves as habitat for numerous wildlife species and vegetation. In addition, the river floodway is part of the San Diego River Park that provides 26 acres of land set aside for public recreation. The Santee Transit Center located approximately 2,500 feet to the southwest provides a trolley line as well as bus service to the area. To the east of the project site is an historic structure, the Polo Barn. To the immediate south is the City's Fire Station No. 4.



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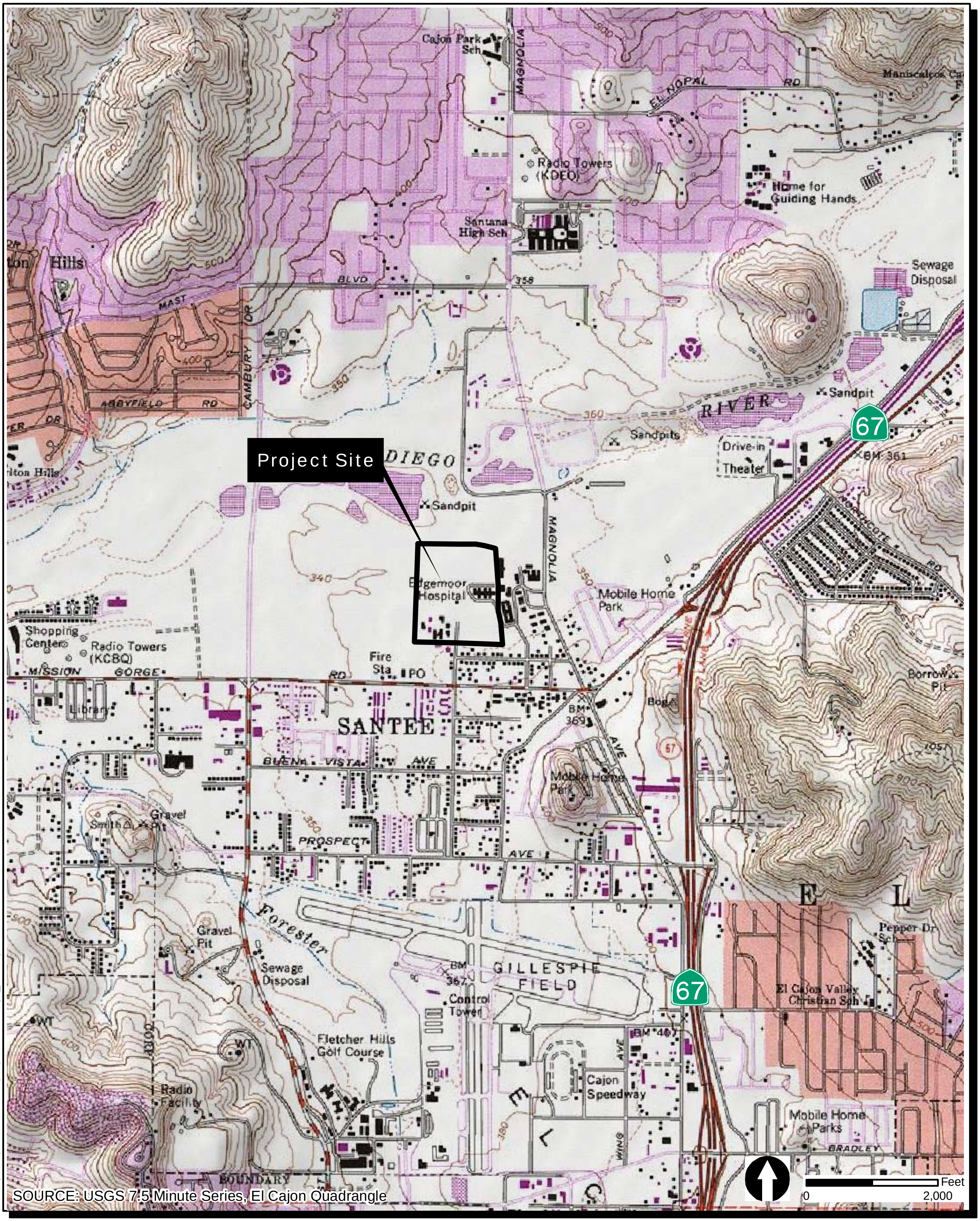
Regional Map

FIGURE
1



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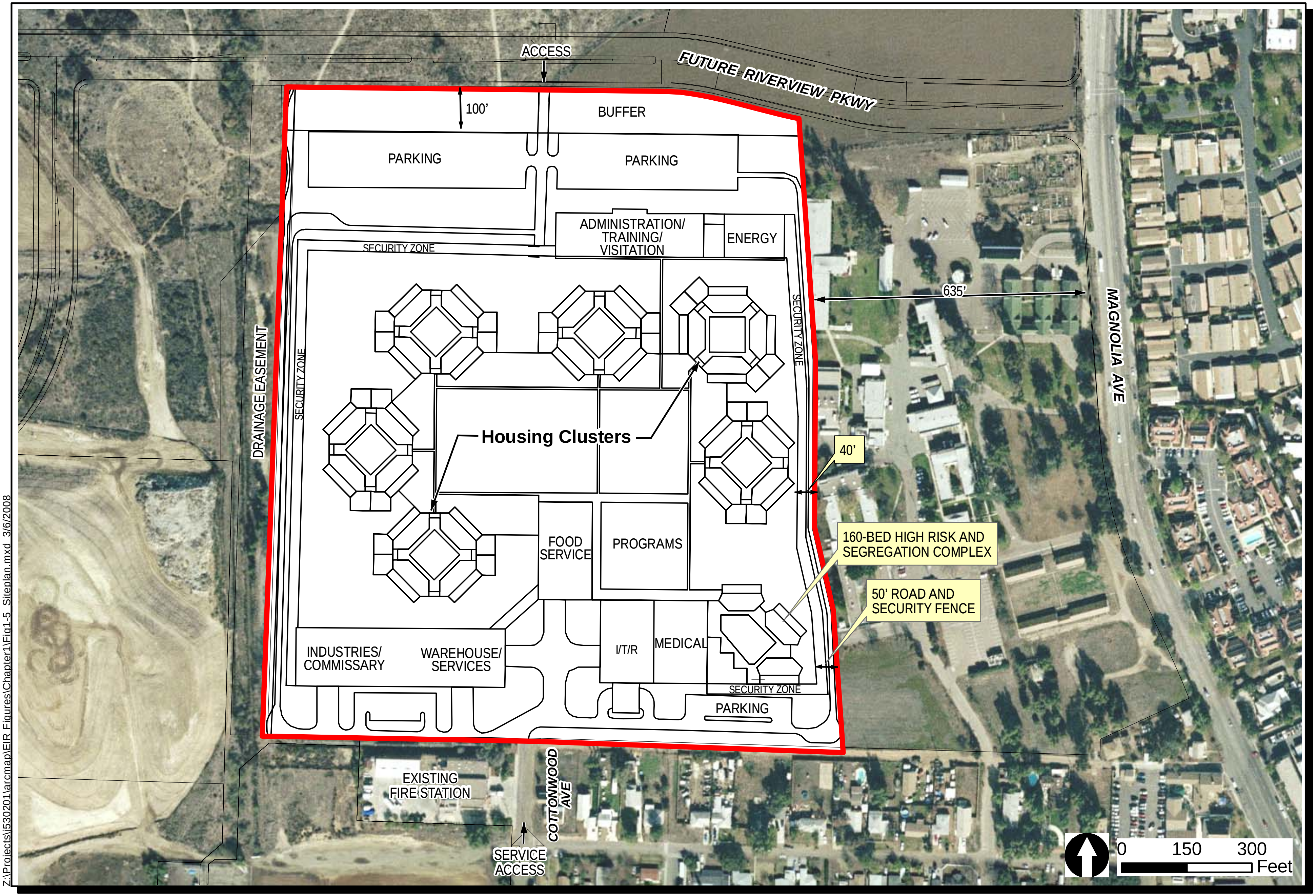
Vicinity Map

FIGURE 2



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Las Colinas Detention Facility - Hydrology & Water Quality Technical Report

Proposed Las Colinas Detention Facility Site Plan

FIGURE
3

Las Colinas Detention Facility - Hydrology & Water Quality Technical Report

Project Site Boundary

FIGURE 4

2.0 METHODOLOGY

Data regarding hydrology and water quality for the site were obtained through a review of pertinent literature, proposed site plans and FEMA Flood Insurance Rate Maps (FIRM). Hydrologic data was evaluated to identify existing drainage basins and flow characteristics. The San Diego County Hydrology Manual procedure was used to determine peak flows on a conceptual level. The City of Santee Standard Urban Storm Water Mitigation Plan (SUSMP) and Jurisdictional Urban Runoff Management Program (JURMP) were utilized to comply with permanent and construction storm water quality requirements through Best Management Practices (BMPs). The San Diego River Watershed Urban Runoff Management Plan was also consulted regarding applicable regulations.

2.1 Literature Review

Surface water and groundwater information was obtained from the San Diego County Water Authority (1997), USGS (Izbecki, 1985), San Diego Hydrology Manual (2003), and additional sources noted in the references section. Water quality information for the site was obtained through a literature review using the following sources: Proposed 2006 List of Water Quality Limited Segments (SWRCB, 2007), Water Quality Control Plan San Diego Basin (SDRWQCB, 1994 with amendments through February 2006), and NPDES Municipal and General Permits (No. CAS0108758 and No. CAS000004). The Revised Draft Technical Report for Total Maximum Daily Loads for Indicator Bacteria Project I – Beaches and Creeks in the San Diego Region (SDRWQCB, 2007) was also used to assess potential impacts to the downstream impaired waterbodies. Soil information was obtained from GEOCON (2004).

2.2 Limitations

This report is based on review of pertinent literature as discussed above. Aquifer characteristics, stream flow, and channel characteristics were defined by other professionals and their data was interpreted by Dudek; however, a detailed field study was beyond the scope of this report. Runoff peak flow rates were estimated based on available information using the rational method outlined in the County of San Diego Hydrology Manual and the requirements of the Santee SUSMP.

3.0 EXISTING CONDITIONS

The proposed project site is within Section 27 in Range 1 West, Township 15 South of the San Bernardino Base and Meridian, U.S. Geological Survey (USGS) 7.5 minute series El Cajon, California Quadrangle. The site is a combination of disturbed lands and existing buildings surrounded by residential development and the San Diego River. The majority of the site consists of level terrain covered by developed land and disturbed vegetation. Developed land uses on the site consist of the existing LCDF and the Edgemoor Hospital Facility (*Figures* 2 and *4*). The existing LCDF is in poor condition and the Edgemoor Hospital Facility is currently being relocated to a site on the north side of the San Diego River where construction of the 150,000-square foot facility has begun. Existing facilities would be removed as part of the overall Edgemoor Hospital Relocation Project.

3.1 Climate

The climate of San Diego County is characterized by warm, dry summers and mild, wet winters. The average rainfall is about 10-13 inches per year, most of which falls between November and February. The average mean temperature for the area is approximately 65 degrees in the coastal zone and 57 degrees in the surrounding foothills (Basin Plan 2005).

3.2 Site Topography

The site is located on a relatively flat alluvial plain associated with the San Diego River. The elevation of the project site is approximately 340 feet above mean sea level (AMSL) based on review of the USGS 7.5 minute series El Cajon, California Quadrangle. The site is generally flat sloping gently to the San Diego River northeast of the project site at a gradient of approximately 0.008 feet per foot (ft/ft).

3.3 Site Soil Types

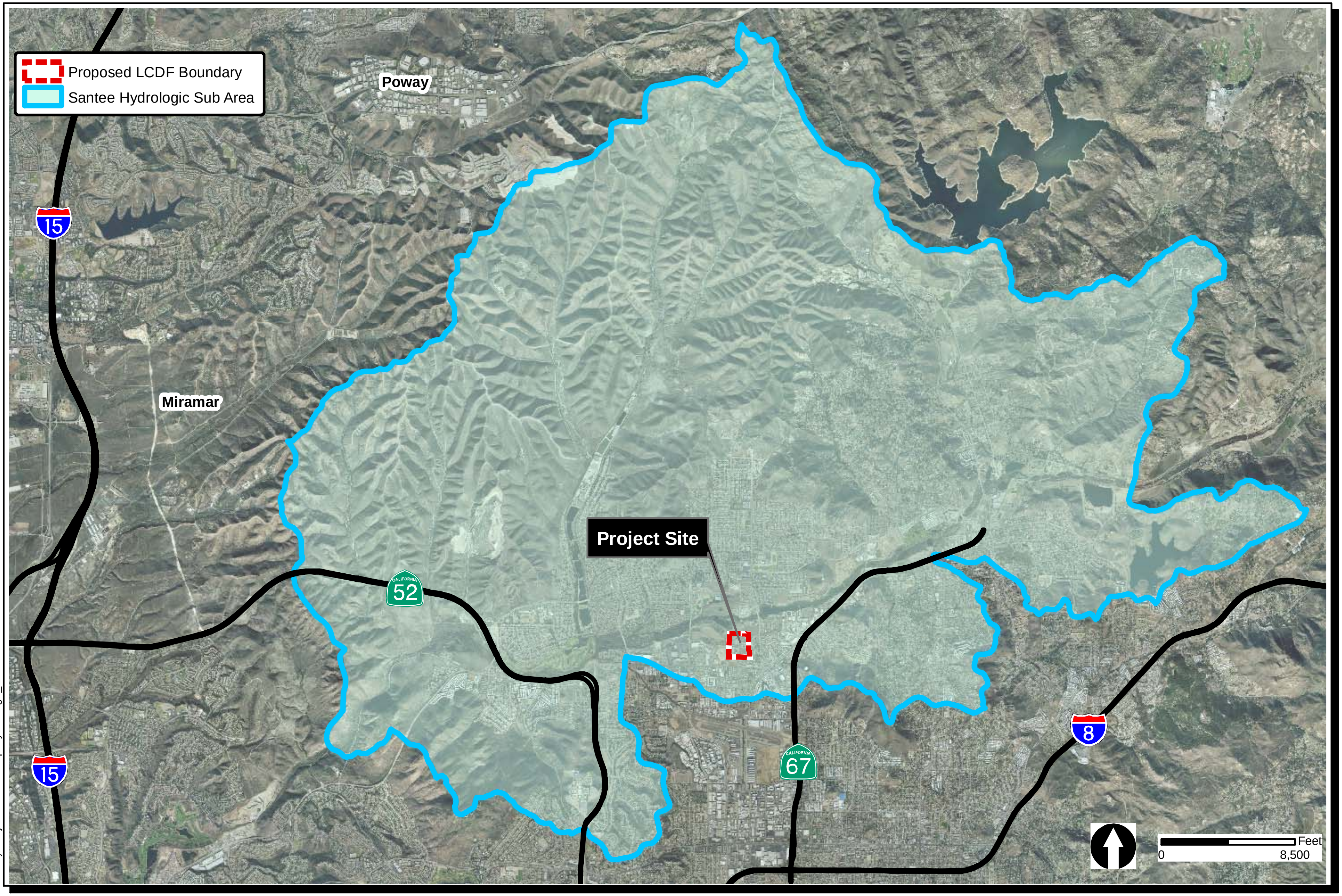
The surficial soil type at the project site is classified as Grangeville fine sandy loam (GoA); 0 to 2 percent slopes by U.S. Department of Agriculture Soil Survey (USDA 1973). Additionally, the geotechnical report prepared for the Town Center Specific Plan describes two surficial soil deposits on the project site consisting of previously placed fill and alluvium (GEOCON 2004). The surficial soil at the site is classified in group B and group B/D by the County of San Diego Hydrology Manual’s Hydrologic Soil Groups Map (San Diego County 2003). Soils are classified by the Natural Resource Conservation Service into four Hydrologic Soil Groups based on the soil's runoff potential. The four Hydrologic Soils Groups are A, B, C and D. Group A generally has the smallest runoff potential and group D the greatest.

3.4 Surface Water

The project site is located in the San Diego Hydrologic Unit (HU) (907.00), which is one of the eleven hydrologic units established within the San Diego Basin as designated in the 1994 San Diego Regional Water Quality Control Board (RWQCB) Water Quality Control Plan for the San Diego Basin (Basin Plan). The San Diego HU is divided into four Hydrologic Areas (HA) and the proposed project site is within the Lower San Diego HA (907.10). The Lower San Diego HA is divided into five Hydrologic Sub-Areas (HSA) and the proposed project site is within the Santee HSA (907.12; *Figure 5*).

The San Diego Basin encompasses approximately 3,900 square miles, including most of San Diego County and portions of southwestern Riverside and Orange Counties. The San Diego HU is a long, triangular-shaped area of approximately 440 square miles drained by the San Diego River that extends from the El Capitan Reservoir to the Pacific Ocean. The San Diego Watershed, as described by Project Clean Water, is the second largest hydrologic unit in San Diego County and has the highest population of the County's watersheds. The San Diego HU contains portions of the cities of San Diego, El Cajon, La Mesa, Poway, and Santee and several unincorporated jurisdictions. Important hydrologic resources in the watershed include five water storage reservoirs, a large groundwater aquifer, extensive riparian habitat, coastal wetlands, and tidepools. Approximately 58% of the San Diego River watershed is currently undeveloped (Project Clean Water 2007). The majority of this undeveloped land is in the upper, eastern portion of the watershed, while the lower reaches are more highly urbanized with residential, freeways and roads, and commercial/ industrial land uses predominating (Project Clean Water 2007).

The City of Santee has three major drainage courses and three secondary drainage courses. All of the City's creeks have their own watersheds in addition to lying within the larger San Diego River watershed. All of these watersheds empty into the San Diego River, which conveys flow westward to the Pacific Ocean. Runoff from the project site ultimately flows to the San Diego River through existing storm water conveyance systems. An improved drainage swale is located to the north of the proposed project, north of the existing LCDF that connects to the San Diego River. A graded channel that connects with the San Diego River is also located to the west of the



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Santee Hydrologic Sub Area Watershed Map

FIGURE 5

existing detention facility running north-south. Existing drainage improvements in the project vicinity include storm drains and drainage pipes located in Mission Gorge Road, Town Center Parkway, Transit Way, Civic Center Drive, Cottonwood Avenue and Magnolia Avenue.

Review of the USGS stream gauge data (monthly average) for the San Diego River in Santee at Mast Road (Latitude 32°50'25", Longitude 117°01"30"), available between May 1912 and May 2007 indicate that there is generally perennial flow in the river. Low flow conditions correspond with dry weather generally from June through November and high flow conditions correspond with wet weather generally from December to as late as May with highly variable flow from one year to the next. For instance, the maximum flow rate recorded for the 95 year period of record was 1,871 cubic feet per second (CFS) on February 1, 1927, compared to a maximum flow rate of 32.2 CFS during the 2006-2007 wet season. On average, coastal areas in San Diego County receive approximately 10 to 13 inches of rainfall per year. Although, areas at higher elevation within the watershed receive up to 30 inches of rainfall on average per year (San Diego County 2003). The majority of the rainfall at higher elevations is intercepted by the Cuyamaca, El Capitan and San Vicente Reservoirs upstream of the project site. Lake Murray is located downstream of project site and Lake Jennings receives flow only from the San Diego Aqueduct. The reservoirs are summarized below in *Table 1, San Diego River Watershed Reservoirs* and discussed further in *Section 3.6, Dam Inundation*.

Table 1
San Diego River Watershed Reservoirs

Water Reservoir	Owner/Operator	Water Source(s)
Lake Cuyamaca	Helix Water District	Natural Runoff
San Vicente	City of San Diego	First Aqueduct, natural runoff, transfers from Southland Reservoir
El Capitan	City of San Diego	First Aqueduct, natural runoff, upstream releases from Lake Cuyamaca
Lake Jennings	Helix Water District	First Aqueduct
Lake Murray	City of San Diego	Second Aqueduct, transfers from El Capitan and San Vicente Reservoirs

Source: San Diego River Watershed Urban Runoff Management Plan, January 2003.

During years of excessive rainfall generally associated with El Nino, the reservoirs which are primarily designed for water storage and not flood control may overflow, increasing the flow of the San Diego River below the dams. Overflow occurred in 1937, 1941 and 1980 and significant quantities of water were released in 1938, 1939 and 1983 (Izbicki, 1985). Flooding was reported to occur in Santee in 1965 and 1995 (NOAA, 2007).

3.5 Groundwater

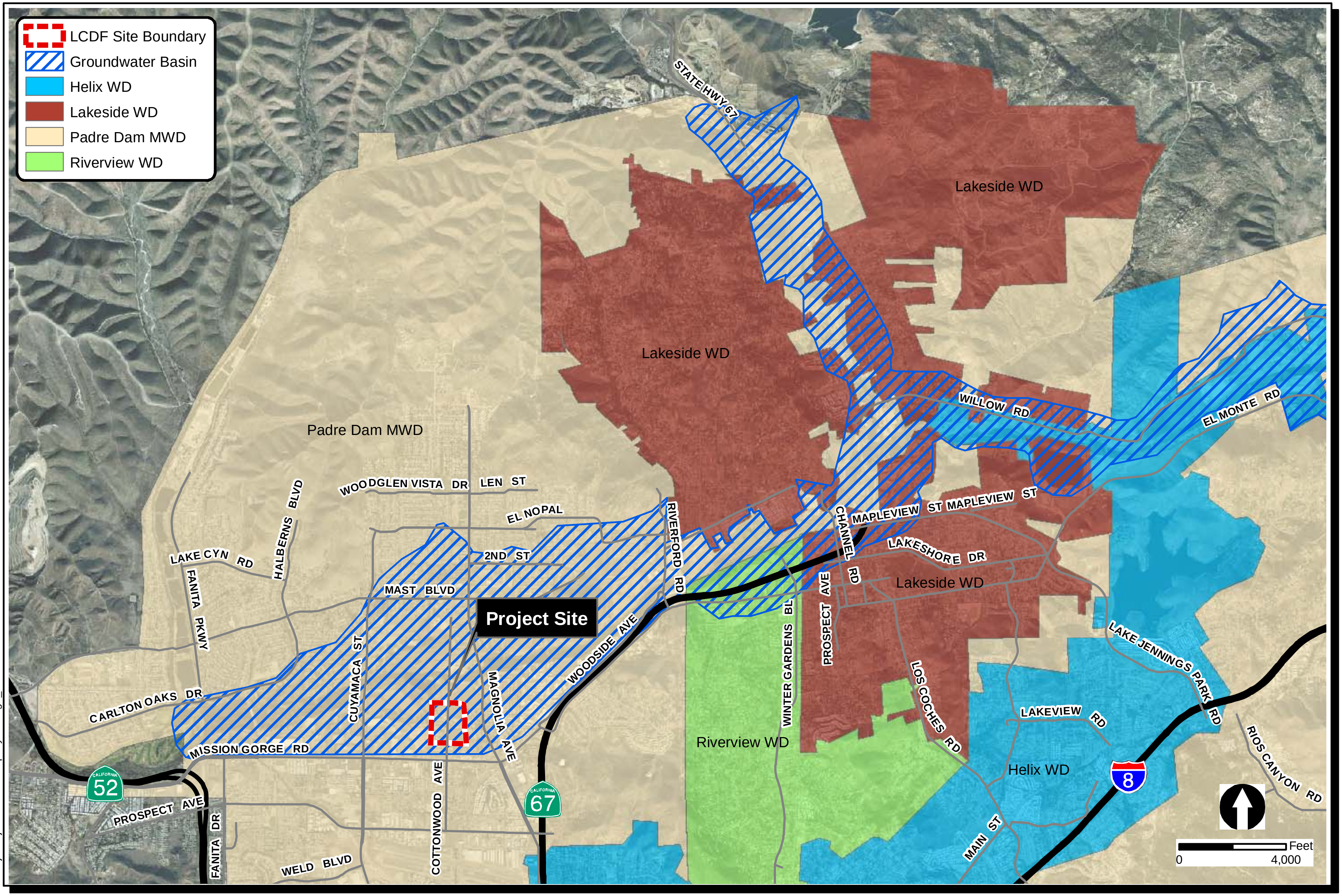
A groundwater basin is defined by the American Geological Institute (AGI) as a hydrogeologic unit containing one large aquifer as well as several connected and interrelated aquifers that has reasonably well defined boundaries and more or less definite areas of recharge and discharge (AGI 1977). All major watersheds in the San Diego Region contain groundwater basins. The proposed project site is located in the approximately seven square mile Santee/El Monte Groundwater Basin (*Figure 6;* San Diego County Water Authority 1997). The Santee-El Monte Basin is an unconfined groundwater basin located in the eastern portion of the San Diego River watershed near the cities of Santee, La Mesa, El Cajon, and Lemon Grove. The alluvial deposits occupy a southwestern trending valley approximately 13 miles long and 1,500 to 5,000 feet wide (Izbicki, 1985). Drained by the San Diego River, this basin underlies the commingling alluvial valleys of the San Diego River, San Vicente Creek, Forester Creek, Los Coches Creek, and Sycamore Canyon Creek. The principal water bearing deposit is alluvium consisting of gravel, sand, silt and clay. This alluvium has an average thickness of 70 feet. The thickness is approximately 230 feet in eastern portion of the basin with a maximum thickness of about 405 feet. In Santee, the alluvium thickness is limited, ranging from less than 10 feet to approximately 30 feet (MWD, 2007). The basin is surrounded by contacts with semi-permeable rocks of the Eocene Poway Group, impermeable Cretaceous crystalline rock, and impermeable Jurassic to Cretaceous Santiago Peak volcanic rocks (DWR 2004). The Santee/El Monte Groundwater Aquifer is summarized below in *Table 2, Santee/El Monte Groundwater Aquifer*.

Table 2
Santee/El Monte Groundwater Aquifer

AQUIFER	Description	Thickness
Santee/El Monte	Unconfined alluvial sediments of gravel, sand, silt and clay surrounded by contacts with semi-permeable rocks of the Eocene Poway Group, and impermeable Santiago Peak volcanic rocks.	Thickness of water bearing units is approximately 10 – 230 feet; depth of groundwater basin is up to 405 feet. In Santee, thickness is limited, ranging from less than 10 feet to approximately 30 feet.

Source: MWD Groundwater Assessment Study. September, 2007.
DWR Groundwater Bulletin 118. 2004.

In the geotechnical investigations prepared for the Town Center Specific Plan by Geocon, groundwater was encountered at depths of 6.5 feet below the ground surface near the San Diego River and 16 feet below the ground surface near the Mission Gorge Road and Cottonwood Avenue intersection (Geocon 2004).



SOURCE: San Diego County Water Authority

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Santee/El Monte Groundwater Basin Map

FIGURE
6

3.6 Floodplain

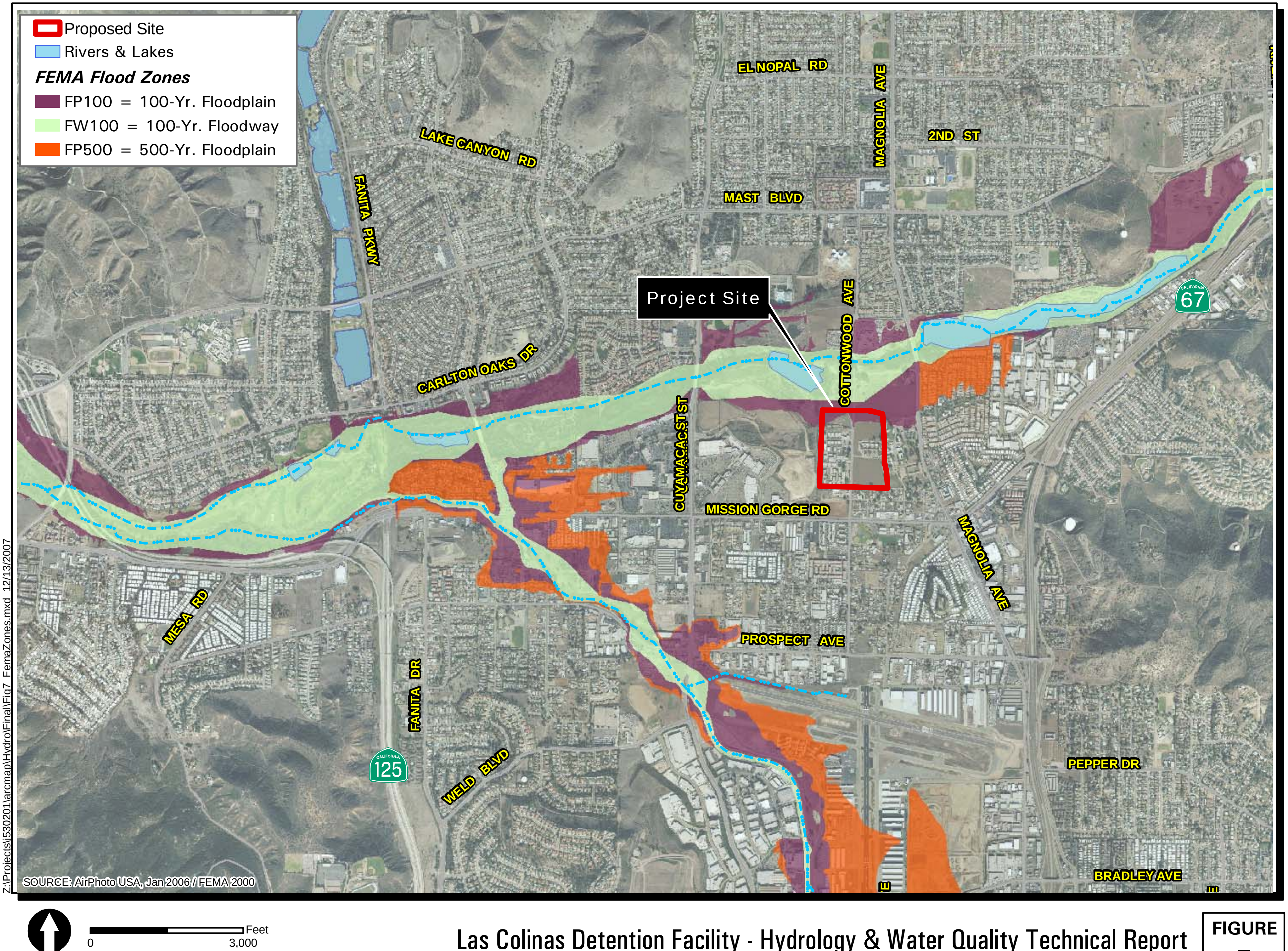
Federal Emergency Management Agency (FEMA) Fire Insurance Rate Maps (FIRMs) identify flood zones and areas that are susceptible to 100-year and 500-year floods. The proposed project site is partially located within a Federal Emergency Management Agency (FEMA) 100-year flood zone, as shown on the SanGIS flood zone interactive map (SanGIS, accessed January 5, 2007) and displayed in *Figure 7*. The base flood discharge used for the San Diego River is 45,000 CFS (Santee MC 15.52). Also, the City of Santee regulates its floodplains more strictly than FEMA. With adoption of its Flood Drainage Prevention Ordinance (Santee MC 15.52), the City raised the base flood discharge of the San Diego River. As a result the northern portion of the project site is also located within a "special flood hazards inundated by 100-year flood" area as designated by the City of Santee. Future Riverview Parkway is planned to be constructed prior to construction of the LCDF, along the northern LCDF boundary. The northern section of the LCDF site would then be developed to match the grade of Riverview Parkway. The site grading necessary to match the future Riverview Parkway grade would occur within the FEMA and City flood zones. With fill and grading completed to match the future Riverview Parkway grade, the elevation of the LCDF site would be raised above the flood zones, and no LCDF structures would be located within a FEMA or City flood zone.

3.7 Dam Inundation Areas

The City of Santee General Plan 2020 includes areas within the City of Santee where inundation from a potential dam failure could occur. The inundation maps for the El Capitan Dam and San Vicente Dam were prepared in 1974 for the City of San Diego. The inundation map for the Chet Harrit (Lake Jennings) Dam was prepared in 1975 for the Helix Water District. The project site is located within the El Capitan Reservoir, Lake Jennings, and San Vicente Reservoir inundation areas, as described below.

El Capitan Dam: The El Capitan Dam is roughly ten miles upstream from the project site. The dam was constructed in 1935 by hydraulic fill methods, which includes rock-fill with a clay core. The dam has a storage capacity of 112,807 acre-feet of water at the spillway elevation of 750 feet above sea level.

Chet Harrit Dam (Lake Jennings): The dam is an earth-fill dam located approximately three miles east of the project site. Lake Jennings which is retained by the dam has approximately 10,700 acre-feet of capacity. The dam was constructed in 1962 by modern methods aimed to reduce potential impacts from seismic damage.



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FEMA Flood Zone Map

FIGURE 7

San Vicente Dam: The San Vicente Dam consists of a concrete gravity structure located approximately 3.5 miles northeast of the project site. The dam was constructed in 1943 and has a capacity of 90,230 acre-feet of water. Studies completed in 1981 concluded the dam was capable of resisting seismic damage under the regional seismic regime. The San Diego County Water Authority is proposing to raise San Vicente Dam by 54 feet to provide room for additional water. Modeling conducted estimated that the downstream dam break flood zone would not change substantially with the expanded reservoir.

3.8 Site Reconnaissance

A reconnaissance of the project site was conducted on December 14, 2007 to assess the existing conditions as required by the Santee SUSMP. In particular, downstream conditions were assessed to determine potential for undercutting erosion, slope stability, vegetative stress (due to flooding, erosion, water quality degradation, or loss of water supplies) and the area's susceptibility to erosion or habitat alteration as a result of an altered flow regime. Areas of the proposed project site outside of the existing footprints of the Edgemoor Hospital and LCDF consist of fallow agricultural land. The majority of runoff from the agricultural land flows overland to east-west running unimproved drainage ditches that discharge to the main unimproved drainage channel that runs in a north-south direction toward the San Diego River (*Figure 8*). The portion of the Edgemoor Hospital within the proposed project boundary consists of buildings, driveways and parking lots. Few storm drain inlets were observed and the majority of runoff from the hospital site sheet flows toward the agricultural fields. The existing LCDF is a compound consisting of several buildings, parking lots, driveways and landscaped areas. The interior of the facility was not entered during the site visit, but review of aerial photographs indicates that a majority of the northern portion of the site consists of impermeable surfaces including asphalt, roofing and other hardscape. The southern portion of the site contains more landscaping including vegetated courtyards and fields. Runoff from LCDF is reported to discharge to the north-south running channel located to the west of the facility.

To assess downstream conditions, the north-south running unimproved channel west of the LCDF was viewed from several vantage points as follows: 1) The channel was observed adjacent to the southwest corner of the proposed site boundary where silt fencing has been placed along the west side of the channel presumably as a BMP for grading and rock crushing ongoing at the adjacent Santee Town Center project. Sparse vegetation was observed on the bottom of the channel with more vegetation located on the slopes at this location. 2) The channel was observed at its confluence with the San Diego River where dense riparian vegetation was observed in the lower approximately 500 feet of the channel. This portion of the channel is mapped within a wetland under the jurisdiction of the California Department of Fish and Game in the Biological

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Drainage Area Map

FIGURE 8

Resources Map for the site available in the EIR in Section 2.1. Above the confluence with the San Diego River, the root structure of the riparian vegetation has limited incising, bank erosion and bank undercutting of the channel. The bottom of the channel was not vegetated and was dry during the site visit. Recent fluvial action was evident based on absence of detritus in the channel which consists of a uniform bottom of sand and silt. Heavy rains occurred on November 30, 2007 with limited transportation of sediment.

3.9 Water Quality Regulations

The site is located within the City of Santee Municipal Separate Storm Sewer System (MS4), and permanent and construction storm water quality requirements in the City of Santee's Standard Urban Storm Water Mitigation Plan (SUSMP) are identified. The following section provides background for the water quality regulations relevant to the site.

3.9.1 Federal Water Pollution Control Act (Clean Water Act)

Increasing public awareness and concern for controlling water pollution led to enactment of the Federal Water Pollution Control Act Amendments of 1972. As amended in 1977, this law became commonly known as the Clean Water Act. The Act established basic guidelines for regulating discharges of pollutants into the waters of the United States. The Clean Water Act requires that states adopt water quality standards to protect public health, enhance the quality of water resources, and ensure implementation of the Act.

- ***Section 401.*** Section 401 of the Clean Water Act requires an applicant for a federal permit, such as the construction or operation of a facility that may result in the discharge of a pollutant, to obtain certification of those activities from the state in which the discharge originates. This process is known as the Water Quality Certification for the project. For projects in San Diego County, the San Diego Regional Water Quality Control Board (RWQCB) issues Section 401 permits.

- ***Section 402.*** Section 402 of the Clean Water Act established the National Pollution Discharge Elimination System (NPDES) to control water pollution by regulating point sources that discharge pollutants into waters of the United States. In the State of California, the EPA has authorized the State Water Resource Control Board (SWRCB) permitting authority to implement the NPDES program. In general, the State Water Resource Control Board issues two baseline general permits: one for industrial discharges and one for construction activities. The Phase II Rule that became final on December 8, 1999, expanded the existing NPDES program to address storm water discharges from construction sites that disturb land equal to or greater than one acre.

- ***Section 404.*** Section 404 of the Clean Water Act established a permitting program to regulate the discharge of dredged or filled material into waters of the United States. The definition of waters of the United States includes wetlands adjacent to national waters. This permitting program is administered by the Army Corp of Engineers (ACOE) and is enforced by the Environmental Protection Agency (EPA).

- ***Section 303(d).*** Under Section 303(d) of the Clean Water Act, the SWRQB is required to develop a list of water quality limited segments for jurisdictional waters of the United States. The RWQCBs are responsible for establishing priority rankings and developing action plans, referred to as total maximum daily loads (TMDLs), to improve water quality of waterbodies included in the 303(d) list. The most recent 303(d) List of Water Quality Limited Segments approved by the EPA is from 2003; however, a draft updated list was prepared in 2006 and is still being finalized. This report references the 2006 list. The list includes pollutants causing impairment to receiving waters or, in some cases, the condition leading to impairment. The TMDLs developed to date by the RWQCB for water bodies located downstream from the project site are discussed in Section 3.8.1.2.

3.9.1.1 303(d) List of Water Quality Limited Segments

The Proposed 2006 CWA 303(d) List of Water Quality Limited Segments classifies the San Diego River (Lower), Pacific Shoreline – San Diego HU (San Diego River Mouth, aka Dog Beach), Famosa Slough and Channel, Forester Creek and Murray Reservoir as impaired water bodies. The San Diego River (Lower), Forester Creek, Famosa and San Diego River Mouth are impaired waterbodies located approximately 1.5, 2, 16 and 17.5 miles downstream of the project site, respectively. The pollutant/stressor(s) and potential source(s) for these impaired waterbodies are listed below in *Table 3, Clean Water Act 303(d) List of Water Quality Limited Segments.*

Table 3
Clean Water Act 303(d) List of Water Quality Limited Segments

Location	Pollutant/ Stressor	Potential Source	Proposed TMDL Completion	Estimated Size Affected
San Diego River (Lower)[1]	Fecal Coliform	Urban Runoff/Storm Sewers, Wastewater, Nonpoint/Point Source	2005	16 Miles
	Low Dissolved Oxygen (DO)	Urban Runoff/Storm Sewers, Unknown Nonpoint/Point Source	2019	
	Phosphorous	Urban Runoff/Storm Sewers, Unknown Nonpoint/Point Source	2019	
	TDS	Urban Runoff/Storm Sewers, Flow Regulation/Modification, Natural Sources,	2019	

Table 3
Clean Water Act 303(d) List of Water Quality Limited Segments

Location	Pollutant/ Stressor	Potential Source	Proposed TMDL Completion	Estimated Size Affected
		Unknown Nonpoint/Point Source		
Pacific Shoreline, San Diego HU (San Diego River Mouth, aka Dog Beach)[1]	Indicator Bacteria	Nonpoint/Point Source	2005	0.37 Miles
Famosa Slough and Channel[1]	Eutrophication	Nonpoint Source	2019	32 Acres
Forester Creek	Fecal Coliform Dissolved Oxygen pH Phosphorous TDS	Urban Runoff, Storm Sewers, Spills, Unknown Nonpoint/Point Sources Source Unknown Industrial Point Sources, Habitat Modification, Spills, Unknown Nonpoint/Point Sources Source Unknown Agriculture Return Flows, Urban Runoff/Storm Sewers, Flow Regulation/Modification, Unknown Nonpoint/Point Sources	2005 2019 2019 2019 2019	6.4 Miles
Murray Reservoir	pH	Source Unknown	2019	119 Acres

1) These waterbodies are located downstream of the project site. Source: State Water Resources Control Board, Board Approved October 25, 2006.

3.9.1.2 Total Maximum Daily Loads (TMDLs)

The purpose of a TMDL is to attain the water quality objectives (WQOs) and restore the beneficial uses for impaired waterbodies under Section 303(d) of the CWA. TMDLs represent a strategy for meeting WQOs by allocating quantitative limits for point and non-point pollution sources. A TMDL is defined as the sum of individual waste load allocations (WLAs) for point sources and load allocations (LAs) for non-point sources and natural background such that the capacity of the waterbody to assimilate pollutant loading (i.e., the loading capacity) is not exceeded. Therefore, the TMDL is the maximum amount of pollutant of concern that the waterbody can receive and still attain WQOs.

The San Diego RWQCB released "Total Maximum Daily Loads for Indicator Bacteria, Project I – Beaches and Creeks in the San Diego Region, Revised Draft Technical Report" on June 25, 2007, as required by Section 303(d) of the CWA. The numeric targets for the San Diego River and downstream beaches are presented in *Tables 4 and 5* below, which are excerpted from the "Total Maximum Daily Loads for Indicator Bacteria, Project I – Beaches and Creeks in the San Diego Region, Revised Draft Technical Report." The TMDLs are calculated for fecal coliforms, total coliforms, and enteroccoci in wet and dry weather, and in interim and final phases. The Regional Board concluded that WQOs without any allowable exceedances are sufficient for use as dry weather TMDL targets. The Regional Board is considering a Basin Plan amendment to incorporate these TMDLs, but have not done so at this time. Therefore, the TMDLs are not yet applicable.

Table 4
Interim and Final Wet Weather Numeric Targets for All Beaches

Indicator Bacteria	Interim Targets		Final Targets	
	Numeric Target (MPN/100mL)	Allowable Exceedance Frequency[1]	Numeric Target (MPN/100mL)[3]	Allowable Exceedance Frequency[2]
Fecal Coliforms	400[3]	22%	400[3]	NA
Total Coliforms	10,000[4]	22%	230[5]	NA
Enterococci	61[6]	22%	61[6]	NA

1. Exceedance frequency based on reference system in Los Angeles Region.
2. Not applicable because there is no authorization for a reference system approach in the Basin Plan.
3. Fecal coliform single-sample maximum WQO for REC-1 use at creeks and beaches.
4. Total coliform single-sample maximum WQO for REC-1 use at creeks and beaches.
5. Total coliform single-sample maximum WQO for SHELL use at beaches.
6. Enteroccoci single sample maximum WQO for REC-1 use for moderately or lightly used" and at "designated beach" frequency of use.

Table 5
Interim and Final Numeric Dry Weather Targets for Beaches and Creeks

Indicator Bacteria	Interim Period (MPN/100mL)		Final Targets (MPN/100mL)	
	Beaches[1]	Creeks[1]	Beaches[2]	Creeks[2]
Fecal Coliforms	NA	200	200[1]	200[1]
Total Coliforms	1,000[2]	1,000	70[3]	1,000
Enteroccoci	NA	33	33[4]	33[4]

1. Fecal Coliform 30-day geometric mean WQO for REC-1 use at creeks and beaches
2. Total coliform 30-day geometric mean WQO for REC-1 at beaches
3. Total coliform 30-day geometric mean WQO for SHELL at beaches
4. Enterococci 30-day geometric mean WQO for REC-1 use at impaired creeks and downstream beaches

Bacteria densities in the waters of beaches and creeks have chronically exceeded the numeric WQOs for total, fecal, and enterococci bacteria. Because bacteria loads within urbanized areas generally originate from urban runoff discharged from Municipal Separate Sewer Systems (MS4s), the primary mechanism for TMDL implementation will be increased regulation of these discharges through National Pollutant Discharge Elimination System (NPDES) regulations. For example, the Total Maximum Daily Loads for Indicator Bacteria, Project I – Beaches and Creeks in the San Diego Region, Revised Draft Technical Report reports the following percent reductions (expressed as an annual load) for MS4s for interim wet weather TMDLs for Santee HSA (907.12): 53.3% fecal coliform, 38.2% total coliform, and 42.8% enterococci. The percent reduction (expressed as an annual load) for Municipal MS4s for final wet weather TMDLs for Santee HSA (907.12) is 100% for all these bacteria. The Total Maximum Daily Loads for Indicator Bacteria, Project I – Beaches and Creeks in the San Diego Region, Revised Draft Technical Report also reports the following percent reductions (expressed as a monthly load) for Municipal MS4s for interim/final dry weather TMDLs for Santee HSA (907.12): 69.4% (final) for fecal coliform, 74% (interim) and 98.2% (final) for total coliform, and 93.9% for enterococci.

3.9.1.3 National Pollutant Discharge Elimination System (NPDES)

In 1990, EPA promulgated rules establishing Phase I of the NPDES storm water program for categories of storm water discharge including “medium” and “large” MS4s, which generally serve populations of 100,000 or greater. In 1999, EPA promulgated rules establishing Phase II of the NPDES storm water program for categories of storm water discharge not covered by Phase I including “small” MS4s, such as small communities.

The Regional Board issued the municipal storm water National Pollutant Discharge Elimination System (NPDES) permit (“Municipal Permit”) (Order No. 2001-01, NPDES No. CAS0108758) to the County of San Diego, the City of San Diego, the Port of San Diego, and 17 other cities (called Copermittees or dischargers by owning or operating a MS4) on February 21, 2001. The Municipal Permit requires each Copermittee to adopt its own Local Standard Urban Storm Water Mitigation Plan (SUSMP) and ordinances consistent with the Regional Board-approved Model SUSMP. The City of Santee implements a plan to reduce pollution to receiving waters through BMPs as discussed further in Section 3.8.3. The City of Santee SUSMP was effective as of November 2002 and the Municipal Permit (Order No. R9-2007-0001, NPDES No. CAS0108758) was renewed on January 24, 2007. Major revisions required by the RWQCB to the SUSMP for projects less than 50 acres in size will occur in July 2008. Projects receiving permits after plan approval by the RWQCB will be required to incorporate low impact development (LID) design concepts into the project design. Additionally, projects shall not increase stormwater runoff rates and duration as a result of development.

As part of the Phase II of the Municipal Permit, the SWRCB adopted Order No. 2003-0005-DWR (General Permit No. CAS000004) for small MS4s, which requires these MS4s to develop and implement a Storm Water Management Plan (SWMP) with the goal of reducing the discharge of pollutants to the maximum extent possible (MEP). The Regional Board requires the owners or operators of these MS4s in watersheds subject to TMDLs to submit Notices of Intent (NOI) to comply with this Order. The SWRCB and Regional Board designate the City of Santee as a municipal copermittee that owns and operates a MS4.

3.9.2 California Water Code (CWC)

The California Water Code (CWC) is comprised of 31 divisions that contain statutory provisions that regulate water in the State of California.

3.9.2.1 Porter-Cologne Act

The Porter-Cologne Water Quality Control Act (the Act) is Division 7 of the CWC and is directed primarily towards the control of water quality. The Act establishes the State Board and its nine regional boards as the principal state agencies responsible for control of water quality. As such, each regional board is required to formulate and adopt a Water Quality Control Plan (Basin Plan), which designates beneficial uses and establishes WQOs to protect these beneficial uses.

3.9.2.2 San Diego Regional Board's Basin Plan

San Diego Regional Board's Basin Plan was approved by the SWRCB in 1994 and includes Triennial Reviews in 1998 and 2004 as well as amendments adopted by the Regional Board through February 8, 2006. The Regional Board designates beneficial uses in the Basin Plan under CWC 13240. Beneficial uses are defined as the uses of water necessary for the survival or well-being of man, plants, and wildlife. Designated beneficial uses in inland surface waters, coastal waters and groundwaters near the site are defined below according to the Basin Plan in *Tables 6* through *8.*

Table 6
Beneficial Uses of Inland Surface Water: San Diego River

Inland Surface Waters	Basin Number	Beneficial Uses								
		MUN	AGR	IND	REC 1	REC 2	WARM	COLD	WILD	RARE
San Diego River	907.12	O		X	X	X	X	X	X	X

\+ Excepted from MUN (State Board Resolution No. 88-63, *Sources of Drinking Water Policy).*

O Potential Beneficial Use

X Existing Beneficial Use

Table 7
Beneficial Uses of Coastal Water: Mouth of San Diego

Inland Surface Waters	Basin Number	Beneficial Uses														
		IND	NAV	REC!	REC2	COMM	BIOL	EST	WILD	RARE	MAR	AAQA	MIGR	SPWN	WARM	SHELL
San Diego River Mouth	907.11			X	X	X		X	X	X	X		X			X

X Existing Beneficial Use

Table 8
Beneficial Uses of Groundwater: Santee Hydrologic Sub-Area (HSA)

Groundwater	Basin Number	Beneficial Uses					
		MUN	AGR	IND	PROC	FRSH	GWR
San Diego HU	907.00						
Lower San Diego HA	907.10						
Santee HSA	907.12	X	X	X	X		

O Potential Beneficial Use

X Existing Beneficial Use

MUN - Municipal and Domestic Supply:
Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

AGR - Agricultural Supply:
Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

IND - Industrial Services Supply:
Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

PROC - Industrial Process Supply
Uses of water for industrial activities that depend primarily on water quality.

FRSH – Freshwater Replenishment
Uses of water for natural or artificial maintenance of surface water quantity or quality (e.g. salinity).

GWR – Groundwater Recharge
Uses of water for artificial recharge of groundwater for purpose of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.

REC I - Contact Water Recreation
Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water skiing, skin and scuba diving, surfing, whitewater activities, fishing, and use of natural hot springs.

REC II - Non-Contact Water Recreation
Uses of water for recreational activities involving proximity to water, but not normally involving contact with water where ingestion is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

WARM - Warm Freshwater Habitat
Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

COLD - Cold Freshwater Habitat
Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

WILD - Wildlife Habitat
Uses of water that support terrestrial ecosystems including, but not limited to, the preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

RARE - Threatened or Endangered Species
Uses if water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.

NAV - Navigation
Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

COMM – Commercial and Sport Fishing

Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended to human consumption or bait process.

BIOL – Preservation of Biological Habitats of Special Significance

Uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.

EST – Estuarine Habitat

Uses of water that support estuarine habitat ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).

MAR – Marine Habitat

Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates or wildlife water and food sources.

AQUA - Aquaculture

Uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption and bait.

MIGR – Migration of Aquatic Organisms

Uses of water that support habitats necessary for migration, acclimatization between fresh and

SPWN – Spawning, Reproduction, and/or Early Development

Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish. This use is applicable only for the protection of anadromous fish.

SHELL – Shellfish Harvesting

Uses of water that support habitats suitable for collection of filter-feeding shellfish (e.g., clams, oysters and mussels) for human consumption, commercial, or sport purposes.

3.9.3 City of Santee's Storm Water Management and Discharge Control Ordinance

The City of Santee's Storm Water Management and Discharge Control Ordinance (Santee Municipal Code 13.42), prohibits the discharge of non-storm water discharges to the storm water conveyance system, except as specified and measures shall be taken to the maximum extent practicable to reduce storm water pollutants. The Santee Standard Urban Storm Water Mitigation

Plan (SUSMP) details the project review and permitting process, identifies permanent BMP selection procedures, and discusses implementation and maintenance requirements for new development and redevelopment projects. Major revisions to the Santee SUSMP to adopt regional low impact development (LID) into the local code are required by July 2009. In the meantime, interim LID permit requirements are in effect as of March 24, 2008. The interim LID permit requirements are as follows: 1) drain runoff from impervious to pervious areas based on capacity, 2) design pervious area to receive runoff based on soils, slope, etc., 3) use permeable pavements, and 4) implement site design BMPs. LID integrated management practices (IMPs) are provided in Section 6.2.5 and site design BMPs are provided in Section 6.2.2. Additionally, the upcoming changes to the SUSMP will require that projects not increase stormwater runoff rates and duration as a result of development. This project is impacted by the upcoming revisions to the SUSMP.

4.0 SIGNIFICANCE THRESHOLDS

Appendix G of the CEQA guidelines provides that a proposed project may have a significant impact on hydrology and water quality if it results in any of the following conditions:

a) Violates any water quality standards or waste discharge requirements?

b) Substantially depletes the groundwater supplies or interferes substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g. the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

c) Substantially alters the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or situation on- or off- site?

d) Substantially alters the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate of amount of surface runoff in a manner which would result in flooding on- or off-site?

e) Creates or contributes runoff water which would exceed the capacity of existing or planned storm water drainage systems or provides substantial additional sources of polluted runoff?

f) Otherwise substantially degrades water quality?

g) Places housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

h) Places within a 100-year flood hazard area structures which would impede or redirect flood flows?

i) Exposes people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of a failure of a levee or a dam?

j) Inundation by seiche, tsunami, or mudflow?

As discussed in Section 3.5.3, the City of Santee completed its SUSMP in December 2002 to comply with EPA Phase II NPDES requirements. The SUSMP includes a general discussion of BMPs under the following minimum control measures: 1) public education and outreach on storm water impacts, 2) public involvement / participation, 3) illicit discharge detection and elimination, 4) pollution prevention / good housekeeping for facilities operation and maintenance, 5) construction site storm water runoff control, and 6) post-construction storm water management in new development and redevelopment. Dudek assessed project impacts and mitigation measures according to the City of Santee SUSMP Manual, which aims to effectively prohibit non-storm water discharges and reduce discharge of pollutants from storm water conveyance systems to the maximum extent practicable both during construction and through the use of the developed site. The SUSMP Manual is further discussed in context of project impacts and mitigation measures in Sections 5 and 6, respectively.

5.0 PROJECT IMPACTS

Impact discussions are included below, including impacts to groundwater, water quality, flooding and inundation.

5.1 Summary of Hydrologic Impacts

Potential impacts to the hydrologic regime have been identified and discussed in the sections below. A common impact to the hydrologic regime from development is the increase in impervious surfaces creating a decrease in travel time and an increase in runoff volumes. *Figure 8* depicts existing drainage patterns and drainage features. *Table 9* below provides a summary of the hydrologic impacts. Peak flow rates were estimated using the rational method outlined in the County of San Diego Hydrology Manual and the requirements of the Santee SUSMP.

Table 9
Conceptual Peak Flow Summary

STORM EVENT	EXISTING Q (cfs)[1]	PROPOSED Q (cfs)[1]	CHANGE in Q (cfs)
2-YEAR	39.56	47.89	8.33
10-YEAR	59.52	72.05	12.53
100-YEAR	101.45	122.81	21.36

1. Refer to the Storm Water Runoff Flow Calculations in Appendix A for detailed calculations.

5.1.1 Surface Water

An increase of impermeable surfaces will occur at the project site. Therefore, the storm water runoff that flows from the project site will increase in volume as shown in *Table 9*.

A projected increase of runoff from the site of approximately 19.1 percent has the potential to impact downstream erosion and siltation. BMPs, as discussed in Section 6.2, are required to mitigate for these potential impacts.

The new LID requirements necessitate that projects not increase stormwater runoff rates and duration as a result of development. Therefore, the projected 19 percent increase in runoff rate from the site will require mitigation to achieve no net increase in flow quantities and rates discharged from the site. Mitigation is provided in Section 6.2.

5.1.2 Groundwater

Due to an increase of impermeable surfaces at the site, infiltration to the groundwater basin will decrease; thus reducing the quantity of groundwater recharge. However, storm water runoff from the project site will recharge groundwater if an infiltration basin is selected as a treatment control for the project (See Section 6.2.4), or recharge groundwater in the adjacent downstream unlined channel or alluvial sediments of the San Diego River.

Dewatering may be required during construction; however, the potential impact to groundwater would be temporary and would not substantially deplete groundwater supplies.

5.1.3 Flooding

As described in Section 3.6, the proposed project site is located within a FEMA 100-year flood zone and within a "special flood hazards inundated by 100-year flood" area as designated by the City of Santee. Future Riverview Parkway is planned to be constructed prior to construction of the LCDF, along the northern LCDF boundary. The northern section of the LCDF site would then be developed to match the grade of Riverview Parkway. The site grading necessary to match the future Riverview Parkway grade would occur within the FEMA and City flood zones. With fill and grading completed to match the future Riverview Parkway grade, the elevation of the LCDF site would be raised above the flood zones, and no LCDF structures would be located within a FEMA or City flood zone. Therefore, the project would not affect structures, housing, or people, and impacts would be less than significant.

5.2 Summary of Water Quality Impacts

The proposed developments will not generate significant amounts of non-visible pollutants; however, the following constituents are commonly found on similar developments and could affect water quality. The City's SUSMP Manual identifies the following categories of pollutants that are anticipated and/or could potentially be generated from the proposed project:

- Sediments - Sediments are soils or other surficial materials eroded and then transported or deposited by the action of wind, water, ice, or gravity. Sediments can increase turbidity, clog fish gills, reduce spawning habitat, lower young aquatic organisms survival rates, smother bottom dwelling organisms, and suppress aquatic vegetation growth.

- Nutrients - Nutrients are inorganic substances, such as nitrogen and phosphorus. They commonly exist in the form of mineral salts that are either dissolved or suspended in water. Primary sources of nutrients in urban runoff are fertilizers and eroded soils. Excessive discharge of nutrients to water bodies and streams can cause excessive aquatic algae and plant growth. Such excessive production, referred to as cultural eutrophication, may lead to excessive decay of organic matter in the water body, loss of oxygen in the water, release of toxins in sediment, and the eventual death of aquatic organisms.

- Metals - Metals are raw material components in non-metal products such as fuels, adhesives, paints, and other coatings. Primary source of metal pollution in storm water are typically commercially available metals and metal products. Metals of concern include cadmium, chromium, copper, lead, mercury, and zinc. Lead and chromium have been used as corrosion inhibitors in primer coatings and cooling tower systems. At low concentrations naturally occurring in soil, metals are not toxic. However, at higher concentrations, certain metals can be toxic to aquatic life. Humans can be impacted from contaminated groundwater resources, and bioaccumulation of metals in fish and shellfish. Environmental concerns, regarding the potential for release of metals to the environment, have already led to restricted metal usage in certain applications.

- Organic Compounds - Organic compounds are carbon-based. Commercially available or naturally occurring organic compounds are found in pesticides, solvents, and hydrocarbons. Organic compounds can, at certain concentrations, indirectly or directly constitute a hazard to life or health. When rinsing off objects, toxic levels of solvents and cleaning compounds can be discharged to storm drains. Dirt, grease, and grime retained in the cleaning fluid or rinse water may also adsorb levels of organic compounds that are harmful or hazardous to aquatic life.

- Trash & Debris - Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and biodegradable organic matter (such as leaves, grass cuttings, and food waste) are general waste products on the landscape. The presence of trash & debris may have a significant impact on the recreational value of a water body and aquatic habitat. Excess organic matter can create a high biochemical oxygen demand in a stream and thereby lower its water quality. Also, in areas where stagnant water exists, the presence of excess organic matter can promote septic conditions resulting in the growth of undesirable organisms and the release of odorous and hazardous compounds such as hydrogen sulfide.

- Oxygen-Demanding Substances - This category includes biodegradable organic material as well as chemicals that react with dissolved oxygen in water to form other compounds. Proteins, carbohydrates, and fats are examples of biodegradable organic compounds. Compounds such as ammonia and hydrogen sulfide are examples of oxygen-demanding compounds. The oxygen demand of a substance can lead to depletion of dissolved oxygen in a water body and possibly the development of septic conditions.

- Oil and Grease - Oil and grease are characterized as high-molecular weight organic compounds. Primary sources of oil and grease are petroleum hydrocarbon products, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids. Introduction of these pollutants to the water bodies are very possible due to the wide uses and applications of some of these products in municipal, residential, commercial, industrial, and construction areas. Elevated oil and grease content can decrease the aesthetic value of the water body, as well as the water quality.

- Bacteria and Viruses - Bacteria and viruses are ubiquitous microorganisms that thrive under certain environmental conditions. Their proliferation is typically caused by the transport of animal or human fecal wastes from the watershed. Water, containing excessive bacteria and viruses can alter the aquatic habitat and create a harmful environment for humans and aquatic life. Also, the decomposition of excess organic waste causes increased growth of undesirable organisms in the water.

- Pesticides - Pesticides (including herbicides) are chemical compounds commonly used to control nuisance growth or prevalence of organisms. Excessive application of a pesticide may result in runoff containing toxic levels of its active component.

Table 10 below, summarizes the anticipated and potential pollutants for the project.

Table 10
Anticipated and Potential Pollutants Summary

Project Categories	General Pollutant Categories								
	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Attached Residential	X	X			X	P(1)	P(2)	P	X
Commercial Development(6)	P(1)	P(1)		P(2)	X	P(5)	X	P(3)	P(5)
Restaurants					X	X	X	X	
Parking Lots	P(1)	P(1)	X	X(4)	X	P(5)	X		

X Anticipated .
P Potential

(1) A potential pollutant if landscaping exists on-site

(2) A potential pollutant if the project includes uncovered parking areas.

(3) A potential pollutant if land use involves food or animal waste products.

(4) Including petroleum hydrocarbons

(5) Including solvents

(6) Listed in the Santee SUSMP for Commercial Projects greater than 100,000 ft^2

Portions of the project area are currently developed with these land uses. Therefore, these potential pollutants will not be newly introduced. However, as the existing land uses are expanding in area, there is a potential for the quantity of these pollutants to increase. Therefore, in order to mitigate for water quality impacts that would occur from the project categories, mitigation is provided in Section 6.2.

5.3 Cumulative Impacts

Future and proposed construction projects close to the proposed project could result in cumulative impacts to hydrology and water quality, including the buildout phases of the City's Town Center Specific Plan Amendment area. Urbanization and the associated increase in impervious surfaces associated with these projects would result in an increase in storm water runoff, decreased infiltration, and an increase in pollutant transport. Without effective control, these changes can in turn adversely affect water quality and drainage.

Individual projects are required to address individually generated construction and post-construction runoff in order to comply with the federal Clean Water Act, the State's Porter-Cologne Water Quality Control Act, and the County's Watershed Protection, Storm Water Management, and Discharge Control Ordinance. Adherence to the regulations governed by jurisdictional agencies substantially reduces the cumulative impacts of multiple projects on water quality.

All cumulative projects will be required to prepare a SWPPP per the NPDES under the National Clean Water Act. These SWPPPs will ensure that adequate BMPs are used for each of the projects to minimize water quality impacts. Given current regulations, each project would be constructed and managed in accordance with regional requirements which typically require acquisition of discharge permits and the use of BMPs to limit erosion, control sedimentation, and reduce pollutants in runoff.

Similar to the effects increased runoff can have to water quality, hydrological changes such as increased runoff rates and volumes can overwhelm existing storm water conveyance systems with an increase in impervious surfaces. The proposed project would incrementally increase flows to existing drainage facilities. Contribution to regional water quality degradation and increased runoff would be considered a significant indirect cumulative impact.

6.0 MITIGATION MEASURES

Dudek utilized the SUSMP Manual to guide the following discussion of mitigation measures. The SUSMP Manual directs project applicants to identify pollutants of concern from the project area and in receiving waters, and incorporate all applicable BMPs to mitigate project impacts.

6.1 Best Management Practices (BMPs)

Development projects are required to develop and implement storm water BMPs both during construction and in the project's permanent design to reduce pollutants discharged from the project site, to the maximum extent practicable. Post-construction pollution prevention will be accomplished through the implementation of long-term BMPs as described by the City of Santee's Model SUSMP Manual. In general site design BMPs minimize the potential for degradation of water quality. Source control BMPs help prevent onsite contaminants from entering the drainage system and thereby creating a potential water quality issue. Finally, treatment control BMPs help to reduce or eliminate contaminants from entering the drainage system before water leaves the site. All three types of permanent design BMPs are outlined for the project. BMPs are also necessary to address the increase in runoff from the site in order to prevent excess erosion, siltation, or flooding offsite. In addition, BMPs during construction are also mandated and are discussed in the following section.

6.1.1 Construction Considerations

Dischargers whose projects disturb one or more acres of soil are required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit, 99-08-DWQ). Construction activity subject to this permit includes clearing, grading and disturbances to the ground such as stockpiling or excavation. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP should contain a site map(s) which shows the construction site perimeter, existing and proposed buildings, lots, roadways, storm water collection and discharge points, general topography both before and after construction, and drainage patterns across the project. The SWPPP must list BMPs the discharger will use to protect storm water runoff and the placement of those BMPs in accordance with Caltrans Storm Water Quality Handbooks. Additionally, the SWPPP must contain a visual monitoring programs and a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs. Specific construction BMPs are discussed in Section 6.2.1.

Should groundwater dewatering be necessary during construction, all discharges should be in accordance with San Diego Regional Water Quality Control Board (RWQCB) requirements outlined in Order No. 2001-96, General Waste Discharge Requirements for Groundwater Extraction Wastes from Construction Projects to Surface Waters. A general NPDES dewatering permit will be required to be obtained from the San Diego RWQCB for projects whose extraction exceeds 100,000 gallons per day (GPD), and those less than 100,000 GPD that contain pollutants in order to discharge to surface water. If less than 100,000 GPD is discharged, an exemption from the NPDES dewatering permit will be required to be issued by the San Diego RWQCB. Water extracted during construction dewatering could also be used onsite as dust control, discharged to the sanitary sewer or tanked and hauled to a legal disposal site for treatment as alternatives to obtaining a NPDES dewatering permit; however, these other uses may require other permits.

6.1.2 Permanent Design Consideration

Table 3 lists the impaired waterbodies downstream of the project as defined by the 2006 CWA Section 303(d) List of Water Quality Limited Segments. The nearest impaired waterbody is the Lower San Diego River section located approximately 1.5 miles downstream of the project site. Since both the Lower San Diego River and San Diego River Mouth are impaired by bacteria and because bacteria loads within urbanized area generally originate from urban runoff discharges from Municipal Separate Sewer Systems (MS4s), BMPs that minimize bacteria loading from the project site shall be implemented to the maximum extent practicable. The Lower San Diego River is also listed as impaired by low dissolved oxygen, phosphorous and TDS which shall also be minimized with appropriate BMPs. Additionally, the general pollutants for each project component listed in *Table 9* should also be considered when selecting appropriate BMPs.

Site design, source control, and treatment control BMPs can minimize pollutant loading from the site. These types of BMPs are discussed in Section 6.2.

In addition to the BMPs proposed to minimize impacts to water quality, the potential for flooding needs to be considered during the design of the project. As structures and housing will be built in what is currently the 100 year flood plain, the elevation of the site should be raised to mitigate for potential flooding.

6.1.3 Maintenance Activities

A maintenance plan assuring that all permanent BMPs will be maintained throughout the use of the project components should be developed per the City of Santee's SUSMP. Examples of maintenance include removal of accumulated sediment and trash, thinning of vegetative brush in biotreatment swales, and maintaining the appearance and general status of the vegetation.

The maintenance plan should include the following:

Operation & Maintenance (O&M) Plan:
Describes the designated responsible party to manage the storm water BMPs, employee's training program and duties, operating schedule, maintenance frequency, routine service schedule, specific maintenance activities (including maintenance of storm water conveyance stamps), copies of resource agency permits, and other necessary activities. At a minimum, maintenance agreements should require the applicant to provide inspection and servicing of all permanent treatment BMPs on an annual basis. Depending on the specific treatment control BMPs selected in the final design of the project, maintenance may be required on a more regular basis.

Access Easement/Agreement:

An access easement to the official maintenance entity that shall be binding on the land throughout the life of the project shall be executed, unless the property owner (County) accepts all permanent maintenance responsibilities.

6.2 Mitigation

Applicable site design, source control and treatment control mitigation required to maintain pre-development rainfall runoff characteristics are presented for the project in the following sections. Additionally, mitigation for water quality and groundwater impacts has been included for the project, as appropriate.

6.2.1 Construction BMPs

The following minimum site design BMPs are recommended for projects adjacent to sensitive habitats:

- Scheduling
- Preserving of Existing Vegetation
- Hydraulic Mulch[1]
- Hydroseeding[1]
- Soil Binders[1]
- Straw Mulch[1]
- Geotextiles, Plastic Covers, and Erosion Control Mats[1]
- Earth Dikes/Drainage Swales and Ditches
- Silt Fence[2]
- Desilting Basin[2]
- Fiber Rolls
- Street Sweeping and Vacuuming
- Straw Bale Barrier[2]
- Storm Drain Inlet Protection
- Wind Erosion Control
- Stabilized Construction Entrance/Exit
- Illicit Connection/Illegal Discharge
- Vehicle and Equipment Cleaning
- Vehicle and Equipment Fueling
- Vehicle and Equipment Maintenance
- Materials Delivery and Storage
- Material Use
- Stockpile Management
- Spill Prevention and Control
- Solid Waste Management

1. The permitee shall select one of the five measures listed or a combination thereof to achieve and maintain temporary soil stabilization.
2. The permitee shall select one of the three measures or combination thereof to achieve site perimeter protection.

6.2.2 Site Design BMPs

The following applicable site design BMPs are appropriate to maintain pre-development rainfall runoff characteristics to maintain or reduce pre-development downstream erosion, to limit siltation, and to protect stream habitat:

Maintain Pre-Development Rainfall Runoff Characteristics

- Minimize impervious footprint
- Conserve natural areas and provide buffer zones between natural water bodies and the project footprint
- Construct walkways, trails, overflow parking lots and alleys and other low traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, pavers and granular materials
- Construct streets, sidewalks and parking lots to the minimum widths necessary, provided that safety and a walkable environment are not compromised
- Maintain and preserve natural drainage courses to mimic site's natural hydrologic regime
- Provide runoff storage measures dispersed uniformly throughout a site's landscape with a use of a variety of detention, retention and runoff practices
- Minimize directly connected impervious areas
- Drain rooftops and impervious sidewalks into adjacent landscaping prior to discharging to the storm drain
- Minimize soil compaction
- Maximize canopy interception and water conservation by preserving existing native trees and shrubs and planting additional native or drought tolerant trees and large shrubs

Protect Slopes and Channels

- Convey runoff safely from the tops of slopes
- Minimize disturbances to natural drainages
- Vegetate slopes with native or drought tolerant vegetation
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems
- Stabilize permanent channel crossings
- Install energy dissipaters such as riprap at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion

Project plans shall include storm water BMPs to decrease the potential for erosion of slopes and/or channels, consistent with local codes and ordinances and with the approval of jurisdictional agencies (U.S. Army Corps of Engineers, RWQCB, and Department of Fish & Game).

In addition to the above-mentioned site design BMPs, site design BMPs such as infiltration basins should be considered in order to limit the discharge of additional storm water runoff.

6.2.3 Source Control BMPs

The following source control BMPs are required to minimize the impact of pollution sources:

- Design outdoor material storage areas to reduce pollution introduction
- Design trash storage areas to reduce pollution introduction
- Employ integrated pest management principles
- Use efficient irrigation systems and landscape design
- Provide storm water conveyance system stenciling and signage

Priority Project Requirements

The following requirements shall be incorporated during the BMP selection and design process based on the project categories defined in *Table 10*, *Anticipated Pollutants Summary;* and the requirements of the SUSMP.

Dock Areas

Loading/unloading dock areas shall include the following:

- Cover loading dock areas or design drainage to preclude urban run-on and runoff.
- Direct connections to storm drains form depressed loading docks are prohibited.

Maintenance Bays

Maintenance bays shall include the following:

- Repair/Maintenance bays shall be indoors or designed to preclude run-on and runoff.
- Design a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Connect drains to a sump for collection and disposal.

Vehicle Wash Areas

Projects that include areas for washing/steam cleaning of vehicles shall use the following:

- Self-contained or covered with a roof or overhang.
- Equipped with clarifier or other pretreatment facility.
- Properly connected to sanitary sewer

Outdoor Processing Areas

Outdoor processing equipment operations shall adhere to the following requirements:

- Cover or enclose areas that would be the most significant source of pollutants or slope the area toward a dead-end sump; or, discharge to the sanitary sewer system following appropriate treatment.
- Grade or berm area to prevent run-on from surrounding areas.
- Installation of storm drains in areas of equipment repair is prohibited

Equipment Wash Areas

Outdoor equipment/accessory washing and steam cleaning activities shall use the following:

- Be self-contained or covered with a roof or overhang
- Be equipped with a clarifier, grease trap or other pretreatment facility
- Be properly connected to a sanitary sewer

Parking Areas

To minimize the offsite transport of pollutants from parking areas, the following design concepts shall be considered

- Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design
- Overflow parking may be constructed with permeable paving

6.2.4 Treatment Control BMPs

The following treatment control BMPs are recommended to remove the project's most significant pollutants of concern to high or medium removal efficiency.

- Bioretention Facilities
- Settling Basins (Dry Ponds)
- Wet Ponds and Wetlands
- Infiltration Facilities or Practices
- Media Filters

A single or combination of treatment control BMPs above shall be selected to infiltrate, filter, and/or treat runoff from the project footprint to the numeric sizing treatment standards outlined in the Santee SUSMP. Alternate treatment control BMPs that treat the project's most significant pollutants of concern to high removal efficiency should evaluated during the final design of the project.

6.2.5 LID Integrated Management Practices (IMPs)

As discussed in *Section 3.9.3*, the project is required to implement LID IMPs in order to not increase stormwater runoff rates and duration as a result of development. *Section 5.1* indicates that an approximately 19.1 percent increase in runoff rate was calculated from the proposed project due to an increase in impermeable surfaces. In order to mitigate the 19.1 percent increase in runoff from the proposed project, LID IMPs are required to be incorporated. This will be accomplished by strategic placement of LID IMPs uniformly throughout the project to mimic the natural flow regime. In addition to the site design BMPs and treatment control BMPs, the following specific LID IMPs shall be considered in the projects final design:

- Vegetated roof systems
- Infiltration trench/islands/beds
- Vegetated or Rock swales/filter strips
- Rain Water Harvesting (cisterns/rain barrels)
- Bioretention
- Permeable pavement and materials

7.0 SIGNIFICANCE OF IMPACT AFTER MITIGATION

After application of the proposed mitigation measures, the impact to this project component would be mitigated to a level below significance.

8.0 ACKNOWLEDGEMENTS

This report was prepared by Dudek hydrogeologist Trey Driscoll under the supervision of Derek Reed, P.E., Senior Engineer, Sudath Alvis, P.E., Senior Engineer and Nicole Peacock, P.E., Associate Engineer.

9.0 REFERENCES

2006 List of Impaired Water bodies [303(d) List]. http://www.swrcb.ca.gov/tmdl/303d_update.html

American Geological Institute (AGI). Glossary of Geology. 1977

California Stormwater Quality Association, Stormwater Best Management Practice Handbook, New Development and Redevelopment, January 2003

Caltrans. BMP Retrofit Pilot Program Final Report, Sacramento, California, January 2004.

City of Santee Municipal Code. http://qcode.us/codes/santee/ Accessed December 2007.

City of Santee. Standard Urban Model Water Mitigation Plan (SUSMP). November 2002.

Department of Water Resources (DWR), Groundwater Bulletin 118. San Diego River Valley Groundwater Basin. Last updated February 27, 2004.

Federal Emergency Management Agency (FEMA). Flood Insurance Rate Map, San Diego County, California and incorporated area,

GEOCON. EIR-Level Geotechnical Report Amendment to Town Center Specific Plan. Santee, California. June 28, 2004.

Izbicki, J. A. 1985. Evaluation of the Mission, Santee, and Tijuana Hydrologic Subareas for Reclaimed-Water Use, San Diego County, California. U.S. Geological Survey Water-Resources Investigations Report 85-4032. 99 p.

Metropolitan Water District of Southern California (MWD). Groundwater Assessment Study - A Status Report on the Use of Groundwater in the Service Area of the MWD - Report Number 1308. September 2007. http://www.mwdh2o.com/mwdh2o/pages/yourwater/supply/groundwater/GWAS.html Accessed December 2007.

NOAA. A History of Significant Weather Events in Southern California Organized by Weather Type. January 2007. http://www.wrh.noaa.gov/sgx/document/weatherhistory.pdf Accessed December 2007

Porter-Cologne Water Quality Control Act with Additions and Amendments Effective January 1, 2005, SWRCB, 2005. http://www.swrcb.ca.gov/water_laws/docs/portercologne.pdf http://www.projectcleanwater.org

San Diego County Hydrology Manual, June 2003.

San Diego County Water Authority. San Diego Formation Task Force Study, Fall 1996.

San Diego County Water Authority. Groundwater Report, June 1997.

San Diego Regional Water Quality Control Board. *Revised Draft Technical Report for Total Maximum Daily Loads for Bacteria, Project I - Beaches and Creeks in the San Diego Region*, 9 March 2007.

San Diego Regional Water Quality Control Board. Order No. 2001-96, NPDES No. CAG919002, *General Waste Discharge Requirements for Groundwater Extraction Waste Discharges From Construction, Remediation and Permanent Groundwater Extraction Projects to Surface Waters within the San Diego Region Except for San Diego Bay*.

USDA. Soil Conservation Service and Forest Service. Soil Survey San Diego Area, December 1973.

USGS. Geologic Map of the El Cajon, California Quadrangle, 7.5 minute topographic map, 1955.

USGS. Stream Gauge Data for Station 11022480 San Diego River at Mast Road near Santee. http://waterdata.usgs.gov/ca/nwis/nwisman/?site_no=11022480&agency_cd=USGS, Accessed December 2007.

Water Quality Control Plan for the San Diego Basin – Region 7, Includes Amendments Adopted by the Regional Board through February 8, 2006.

APPENDIX A

Storm Water Runoff Flow Calculations

Methodology

Rainfall runoff characteristics were calculated for the two-year, ten-year and 100-year frequency storms for coastal areas in San Diego County.

Rainfall Isopluvials were obtained form the San Diego County Hydrology Manual and the rational method was utilized to determine the projected runoff from the site given the rainfall events listed above. Existing runoff conditions from the site are also estimated for comparison. Additionally, a field reconnaissance was conducted to observe site conditions.

Calculations

Steps taken to calculate the runoff from the project site are as follows:

1) Determine the Basin Areas (see figure attached)

2) Obtain runoff coefficients per Table 3-1 (Runoff Coefficients for Urban Areas) of the San Diego County Hydrology Manual

3) Calculate the time of concentration (T_C) using the following equation for urban basins:

$$T_C = \frac{1.8\,(1.1-C) * \sqrt{D}}{\sqrt[3]{s}}$$

Where:

C = Runoff Coefficient

D = Distance

s = Slope %

4) Calculate intensities using the following equation from the San Diego County Hydrology Manual:

$$I = 7.44\ P_6 D^{-0.645}$$

Where:

P_6 = adjusted 6-hour storm rainfall amount

D = duration in minutes (use T_C)

5) Solve for Q using the rational method formula as follows:

$$Q = CIA$$

Where:

Q = Runoff in cubic feet per second (cfs)

C = Runoff Coefficient

I = Rainfall Intensity

A = Drainage Area

Results

Existing Two-Year Frequency

Two-Year

P6	1.2	Inch
P24	1.8	Inch
P6/P24[1]	66.67	%
Adjusted P6	1.17	Inch

Drainage Area	Area ACRE	C	Tc MIN	Intensity[2] IN/HR	Q[3] CFS
Basin 1	8.81	0.30	132.43	0.37	0.98
Basin 2	2.71	0.90	4.97	3.09	7.55
Basin 3	7.01	0.84	16.28	1.44	8.48
Basin 4	5.67	0.84	12.66	1.69	8.06
Basin 5	7.15	0.84	8.97	2.11	12.70
Basin 6	8.81	0.30	217.22	0.27	0.72
Basin 7	4.81	0.30	46.22	0.73	1.06
Total	44.98				39.56

1 P6/P24 SHALL BE WITHIN 45%-65%, NOT APPLICABLE TO DESERT

2 I=7.44*P6*Tc^(-0.645)

3 Q=CiA

Existing Ten-Year Frequency

10-Year

P6	1.76	Inch
P24	2.95	Inch
P6/P24[1]	59.66	%
Adjusted P6	1.76	Inch

Drainage Area	Area ACRE	C	Tc MIN	Intensity[2] IN/HR	Q[3] CFS
Basin 1	8.81	0.30	132.43	0.56	1.48
Basin 2	2.71	0.90	4.97	4.65	11.36
Basin 3	7.01	0.84	16.28	2.17	12.76
Basin 4	5.67	0.84	12.66	2.55	12.13
Basin 5	7.15	0.84	8.97	3.18	19.11
Basin 6	8.81	0.30	217.22	0.41	1.08
Basin 7	4.81	0.30	46.22	1.10	1.59
Total	44.98				59.52

1 P6/P24 SHALL BE WITHIN 45%-65%, NOT APPLICABLE TO DESERT

2 I=7.44*P6*Tc^(-0.645)

3 Q=CiA

Existing 100-Year Frequency

100-Year

P6	3.0	Inch
P24	5.0	Inch
P6/P24[1]	60.00	%
Adjusted P6	3.00	Inch

Drainage Area	Area ACRE	C	Tc MIN	Intensity[2] IN/HR	Q[3] CFS
Basin 1	8.81	0.30	132.43	0.96	2.52
Basin 2	2.71	0.90	4.97	7.93	19.37
Basin 3	7.01	0.84	16.28	3.69	21.75
Basin 4	5.67	0.84	12.66	4.34	20.67
Basin 5	7.15	0.84	8.97	5.42	32.57
Basin 6	8.81	0.84	217.22	0.69	1.84
Basin 7	4.81	0.30	46.22	1.88	2.72
Total	44.98	0.30			101.45

1 P6/P24 SHALL BE WITHIN 45%-65%, NOT APPLICABLE TO DESERT

2 I=7.44*P6*Tc^(-0.645)

3 Q=CiA

Potential Two-Year Frequency

Two-Year

P6	1.20	Inch
P24	1.80	Inch
P6/P24[1]	66.67	%
Adjusted P6	1.17	Inch

Drainage Area	Area ACRE	C	Tc MIN	Intensity[2] IN/HR	Q[3] CFS
Basin A	28.98	0.79	18.31	1.33	30.54
Basin B	5.88	0.78	20.51	1.24	5.69
Basin C	10.14	0.78	15.68	1.48	11.66
Total					47.89

1 P6/P24 SHALL WITH 45%-65%, NOT APPLICABLE TO DESERT

2 I=7.44*P6*Tc^(-0.645)

3 Q=CiA

Potential Ten-Year Frequency

Ten-Year

P6	1.76	Inch
P24	2.95	Inch
P6/P24[1]	59.66	%
Adjusted P6	1.76	Inch

Drainage Area	Area ACRE	C	Tc MIN	Intensity[2] IN/HR	Q[3] CFS
Basin A	28.98	0.79	18.31	2.01	45.95
Basin B	5.88	0.78	20.51	1.87	8.55
Basin C	10.14	0.78	15.68	2.22	17.55
Total					72.05

1 P6/P24 SHALL WITH 45%-65%, NOT APPLICABLE TO DESERT

2 I=7.44*P6*Tc^(-0.645)

3 Q=CiA

Potential 100-Year Frequency

100-Year

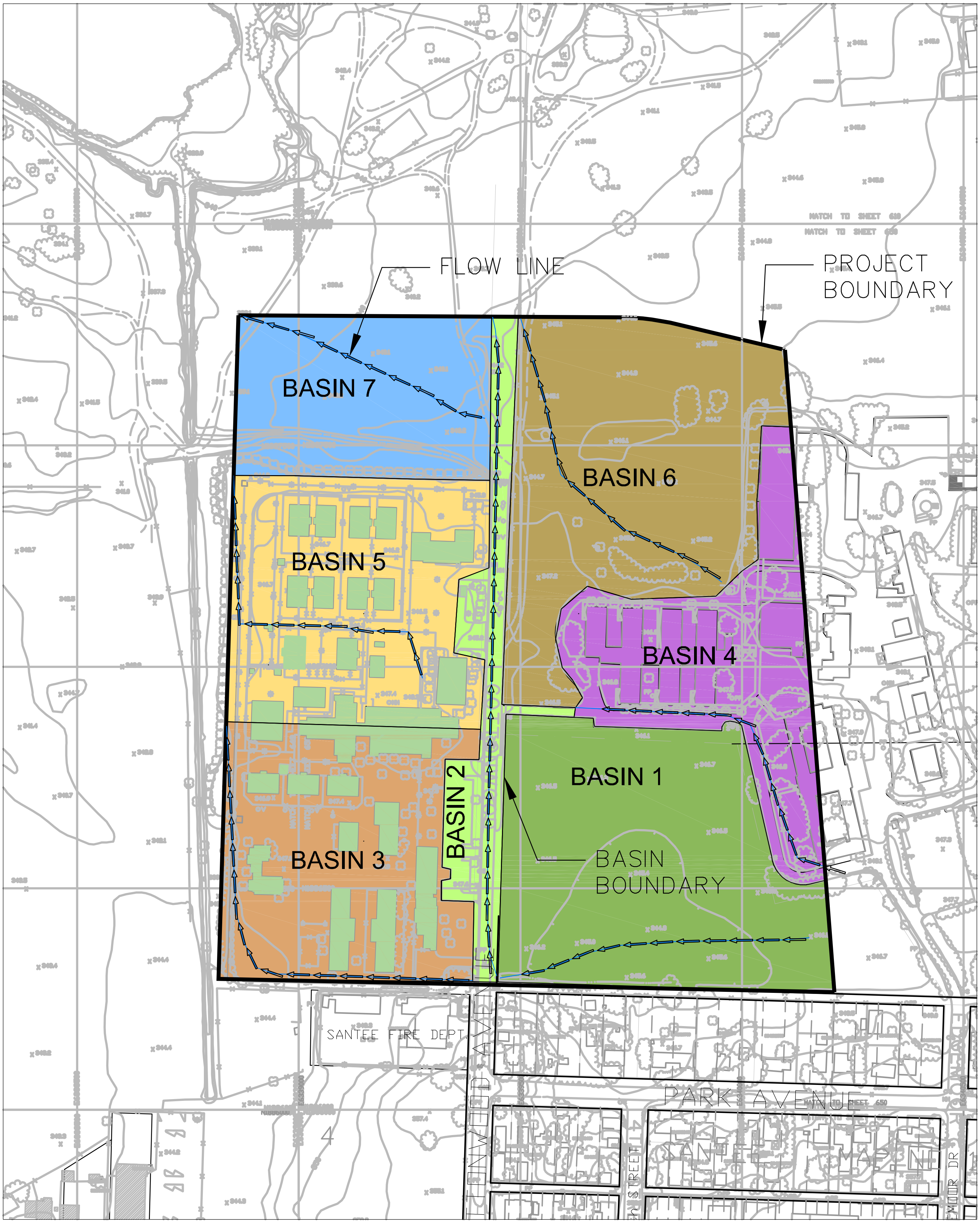
P6	3.00	Inch
P24	5.00	Inch
P6/P24[1]	60.00	%
Adjusted P6	3.00	Inch

Drainage Area	Area ACRE	C	Tc MIN	Intensity[2] IN/HR	Q[3] CFS
Basin A	28.98	0.79	18.31	3.42	78.32
Basin B	5.88	0.78	20.51	3.18	14.58
Basin C	10.14	0.78	15.68	3.78	29.91
Total					122.81

1 P6/P24 SHALL WITH 45%-65%, NOT APPLICABLE TO DESERT

2 I=7.44*P6*Tc^(-0.645)

3 Q=CiA



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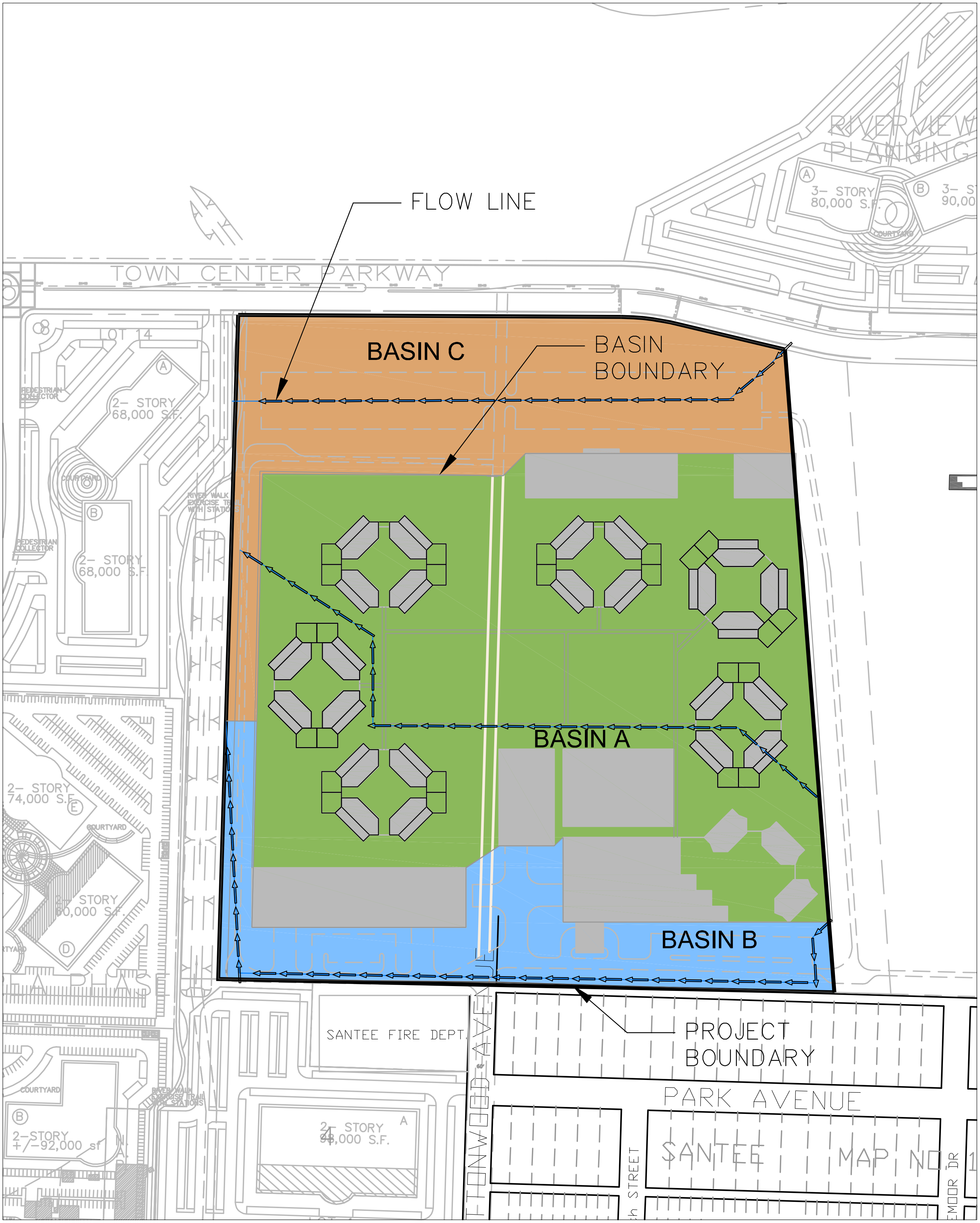
Existing Drainage Area Map

FIGURE A-1



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Proposed Drainage Area Map

FIGURE A-2